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from the south-east, a very unusual direction for tornadoes. The report concludes with a well-emphasized note.

Meteorology in New England. — The Bulletin of the New England meteorological society for the same month is based on reports from 136 observers. The precipitation is found to be 0.96 inch more than the average for ten or more Novembers at 31 stations, and the temperature is 2° 5 above the average. Storms on the 1-3d, 5-9th, and 22-29th, were the chief disturbances of the month. Wind-velocities by anemometer record are given for thirteen stations. Blue Hill had a maximum velocity of 65 miles an hour from the south-east during the storm of the 25-26th, with a total run of 15,389 miles for the month. The Eastport, Boston, and Block Island records for the same are 45 and 8,513, 46 and 9,338, 47 and 13,344, respectively. The tides during the last of the three storms were very high, owing to the concurrence of strong easterly winds, with the time of new moon and the moon's nearest approach to the earth. An increase in the number of stations around Brattleborough, Vt., is noticeable on the map.

Prediction of tornadoes. — A lecture on 'Tornado study' was recently delivered before the Franklin institute in Philadelphia by Lieut. J. P. Finley of the signal office. Probably no one in the country is more conversant with the facts and features of tornado occurrence than Lieutenant Finley, who has made a special study of these destructive storms for a number of years past. Their peculiar characteristics were described, and an account was given of the fifteen hundred volunteer tornado reporters who observe and report on these storms in all parts of the country, according to a plan devised by Lieutenant Finley. It was also announced that predictions of tornadoes are now attempted successfully, although they are not yet published. A dangerous attitude of weather conditions for the eastern middle states was recognized in the morning of Aug. 3 last, and in the afternoon tornadoes occurred at Philadelphia and thereabout.

Cold waves. — A signal-service note, xxiii., is a preliminary study of 'Cold waves and their progress,' by Lieut. T. A. Woodruff. They are found to follow an area of low, and to precede an area of high pressure, but their cause is not considered. Within our territory they nearly always appear first at Helena, Montana, and it is concluded that "they have their origin in the vast regions of ice and snow near the arctic circle far to the north of our stations." It is possible that records from the British north-west territory might disprove this conclusion; for in the winter, when

the cold waves are most frequent, it is not always the polar regions that are coldest. The waves are found to move in different ways: 1°, directly eastward, over the great lakes and across New England, not being felt south of the Ohio valley; 2°, south-easterly, covering the entire country in their progress; 3°, southerly, from Montana and Dakota to Texas, thence through the Gulf states, and finally north-eastward over the Atlantic states, such waves being sometimes felt at St. Louis and Shreveport before reaching St. Paul and Chicago. The number of waves belonging to the three classes during the first six months of the years 1881 to 1884 was 22, 47, and 19. The second class thus appears more frequently than the other two combined. Fifty per cent of the waves appeared simultaneously at Bismarck and Helena. They generally reach Omaha eight to sixteen hours after their appearance at Helena, the distance being 880 miles; St. Louis, 24 to 32 hours, distance 1,030 miles; Galveston, 24 to 40 hours, distance, 1,600 miles; Nashville, the same; Buffalo, 24 to 48 hours, distance 1,750 miles; Washington, 32 to 56 hours, distance 1,953 miles. The difficulty in the prediction of the waves is the same that embarrasses the prediction of storm-centre tracks, for the former follow the latter. There has as yet been no tabulation published by the signal office of the conditions attending the early appearance of areas of low pressure, which afterwards take different directions in crossing the country. A special description is given in the note of the cold wave of March 18, 1883, in which the fall of temperature in twenty-four hours was generally 20° to 40° over the country. The most marked falls of temperature follow well-developed storms, and accompany an area of abnormally high pressure.

NOTES AND NEWS.

UNDER the will of the late Henry N. Johnson, and by the death of his widow in February, 1885, the Academy of natural sciences of Philadelphia, named as residuary legatee, has come into the possession of his entire estate, valued at \$51,761.40. The present annual income from the productive portion, less taxes and water-rent, is \$1,434.82.

— In many respects this is a golden age for children. This is true in the matter of school-books no less than in children's literature. In the 'new eclectic series of geographies,' Van Antwerp, Bragg & Co. have attempted to make the elementary study of geography attractive to children, and presumably with success. Their 'Complete geography' is excellent in its fulness,

its arrangement, in the satisfactory manner in which physical phenomena are described and explained, and in its general accuracy. Their 'Elementary geography' is equally well adapted to infantile minds. The illustrations of both editions are well selected, and are beautifully executed. The maps are modern, and are well adapted to the purposes of instruction. On the whole, the orography—the element with which map-makers have the most difficulty—is fairly, and in some regions excellently, expressed. The registering of the colors on the maps can be very much improved.

— Dr. Daniel G. Brinton of Philadelphia has been announced as laureate of the Société américaine de France for 1885, and has been awarded the medal of the society for his works on the aboriginal languages and mythology of America.

— At about 10.12 P.M. on Dec. 10, a sharp shock of earthquake was felt in Victoria, B.C. It resembled the rapid roll of a heavily laden truck along a paved street. The vibration lasted from ten to fifteen seconds. At New Westminster the shock was felt at precisely the same time, but lasted about forty seconds.

— An atlas of Japan, in seven sheets, is announced by Justus Perthes. Each sheet will be on a scale of 1:1,000,000, and the atlas will be accompanied by a sketch-map on a scale of 1:7,500,000. Four of the sheets have already appeared, and the others will be issued during the coming year.

— The new balloon constructed by the Meudon aeronauts will be directed, says *Nature*, by a steam-engine, as advocated by M. Henry Giffard. Electricity will be quite given up, owing to its want of power for continuous action. From the reports to be published in the next number of the *Comptes rendus*, it appears that a velocity of six metres per second was obtained.

— Mr. Gaurel, at whose sole expense the late expedition to the Kara Sea, under Lieutenant Hovgaard, was undertaken, intends, provided his enterprise be seconded by the government, to send his steamer *Dymphna* next summer on an expedition, under an officer of the Danish royal navy, to the east coast of Greenland to explore and lay down the coast-line between 66°.08, the farthest northward point attained by Captain Hohn's expedition, and 70°.

— On examination of the extensive series of stellar photographs obtained at the Harvard college observatory, it appears that on Nov. 7, 1885, a photograph was taken of the region in which the new star is now visible. The star does not

appear upon this photograph, which shows that at that time it must have been at least half a magnitude fainter than at present.

LETTERS TO THE EDITOR.

What has the coast survey done for science?

THE contributions of the coast survey to general scientific knowledge in America may be said to begin with the year 1844, when Prof. Alexander Dallas Bache succeeded to the superintendency, on the death of Mr. Hassler, in December, 1843.

Mr. Hassler had given all the active energies of his life to a successful inauguration of a work of which few but himself realized the extent, or had any idea of what was implied in a 'survey of the coast of the United States;' and he came from Europe to this country at the beginning of the present century, when our country was still barely recognized among nations, and its few and ablest men were too much engaged in meeting and solving the practical problems of existence for the nation generally, and for themselves individually.

The number of men at that time who had made their mark as original investigators and thinkers in the different branches of astronomy, chemistry, mathematics, and physics, were so few that they might be counted upon the fingers. A few of the associates of the illustrious Franklin, among them Rittenhouse, Ellicott, and some others of the American philosophical society of Philadelphia, were joined by others from abroad—men like Priestly and Gallatin—in correspondence with men of like pursuits in England, France, and Germany, and were slowly and quietly laying the foundation for the building-up of a spirit of scholarship and physical inquiry, which rapidly developed after peace came finally to the country, in 1845, producing such men as Bowditch, Nicollet, and many others.

Mr. Hassler came to this country accredited as a man of learning and ability by the French academy. Being a native of Switzerland, he became intimate with his countryman, the eminent statesman Albert Gallatin, who was at that time secretary of the treasury under President Jefferson. The President had himself been given greatly to philosophic studies, and had, while resident in France, been the companion and friend of many of the most eminent men of science in that country.

It was through Mr. Gallatin's active and powerful aid that the idea originated by Mr. Hassler, of a great general 'survey of the coast of the United States,' was brought to Mr. Jefferson's notice, and his powerful aid secured in obtaining the passage of the act of February, 1807, which is still the legal basis of its existence.

Obstacles of various sorts arose in the way of carrying the act into execution. Chief among them was the war of 1812-15 and its consequent debt, crippling the means of the nation. Started in 1816, it was shortly after transferred to the navy, where it languished until, in 1834, it was re-transferred to the treasury department, where it has ever since remained.

The principle of organization adopted (and still adhered to, so far as practicable) was carried forward by Mr. Hassler under many difficulties, which were brought to the notice of congress, and resulted in the reference of the whole subject to a committee of